The present invention encompasses a method for transmitting information regarding the synchronization status of a base station. The method comprises the steps of determining if a base station is operating in a synchronized mode or an unsynchronized mode and transmitting a first group identification code (GIC) to a remote unit if the base station is operating in a synchronized mode, otherwise transmitting a second GIC to the remote unit if the base station is operating in an unsynchronized mode. In the preferred embodiment of the present invention the GIC indicates a spreading code group to which a spreading code utilized by the base station belongs.

The present invention additionally encompasses a method for transmitting information regarding the synchronization status of a neighboring base station. The method comprises determining, by a first base station, a synchronization status of the neighboring base station and transmitting a neighbor list message to a remote unit, the neighbor list comprising a group identification code (GIC) corresponding to the neighbor base station. As discussed above, the GIC indicates a spreading code group to which a spreading code utilized by the neighbor base station belongs.

Finally, the present invention encompasses an apparatus for transmitting information regarding the synchronization status of a base station in a Code Division, Multiple Access (CDMA) communication system. The apparatus comprises a controller for determining if a base station is operating in a synchronized mode or an unsynchronized mode; and spreading circuitry, coupled to the controller, for spreading modulated data with a spreading code. In the preferred embodiment of the present invention, the spreading code determined based on the synchronization status of the base station.

FIG. **1** is a block diagram of a wireless communication system in accordance with the preferred embodiment of the present invention. In the preferred embodiment of the present invention, communication system **100** utilizes a CDMA system protocol as described in ANSI J-STD-008. However, in alternate embodiments communication system **100** may utilize other digital cellular communication system protocols such as, but not limited to, the next-generation CDMA protocols, including direct sequence spread spectrum or slow frequency hopping spread spectrum systems. Communication system **100** includes base station **101**, base station **102**, remote unit **113**, Centralized Base Station Controller (CBSC) **103**, and Mobile Switching Center (MSC) **104**. In the preferred embodiment of the present invention base stations **101** and **102** are preferably Motorola SC9600 base stations, MSC **104** is preferably a Motorola EMX2500 MSC, and CBSC **103** is preferably comprised of a Motorola SG1128BF CBSC component. As shown, remote unit **113** is communicating with base stations **101** and **102** via uplink communication signals **119** and base stations **101** and **102** are communicating with remote unit **113** via downlink communication signals **116**. In the preferred embodiment of the present invention, base stations **101** and **102** are suitably coupled to CBSC **103**, and CBSC **103** is suitably coupled to MSC **104**.

Operation of communication system **100** occurs as follows: Base stations within communication system **100** continuously broadcast a control channel (via downlink communication signal **116**) that is utilized by remote unit **113** in accessing communication system **100**. Once remote unit **113** has determined a base station having a strongest control channel (in this case, base station **101**), remote unit uses the timing of the control channel to time align to base station **101**. In particular, as described in "Fast Cell Search Algorithm in DS-CDMA Mobile Radio Using Long Spreading Codes" by K. Higuchi et al., and incorporated by reference herein, a fast cell search algorithm based on periodic long code masking is utilized by remote unit **113** to time align to base station **101**. As described by Higuchi et al., a common short code (CSC) is periodically masked over the long code. Remote unit **113** exploits the fact that the CSC periodically appears in the long code to detect the phase of the long code.

Unlike prior art methods of long code utilization, in the preferred embodiment of the present invention the particular long code utilized by base stations within communication system **100** is dependent upon whether the particular base station is operating in a synchronized, or an unsynchronized mode. In particular, unsynchronized base stations within communication system **100** utilize a long code unique to the particular base station, and base stations operating in a synchronized mode utilize a time shifted version of the same long code. During acquisition, remote unit **113** uses searcher **131** to detect the presence of a particular long code, where a single time shifted long code is utilized for all synchronized base stations, and a plurality of long codes are utilized for unsynchronized base stations within communication system **100**. For synchronized base stations, remote unit **113** will detect all synchronized base stations in the geographic region if it searches the entire length of the single long code. In the preferred embodiment, synchronized base stations are time offset from each other by integer multiples of 64 PN chips, thus allowing greater than 512 unique offsets of the 40,960 chips. For unsynchronized base stations, remote unit **113** will detect all unsynchronized base stations in the geographic area if all long codes utilized by the unsynchronized base stations are searched. In the preferred embodiment of the present invention, 511 specific long codes are utilized by the unsynchronized base stations within communication system **100**.

To reduce the search time for remote units within communication system **100** (i.e., to avoid searching through every single long code), a group identification code (GIC) is broadcast during a time period that the long code is masked. The GIC indicates a long code (spreading code) group to which the long code of each base station belongs. Additionally, each base station within communication system **100** determines its synchronization status (i.e., synchronized or unsynchronized), and utilizes a particular GIC and long code based on the base station's synchronization status. As indicated above, 512 specific long codes are utilized. Remote units within communication system **100** will receive the GIC transmitted from a particular base station and access GIC database **114** to determine if a particular GIC belongs to a synchronized or an unsynchronized base station. For example, if base stations within communication system **100** are utilizing a particular GIC to identify synchronized base stations (e.g., GIC_**16**), then all remote units within communication system **100** will have prior knowledge (via internal storage **114**) that if GIC_**16** is detected, the GIC was transmitted from a synchronized base station. In the preferred embodiment of the present invention, the number of GICs are 16, where 32 long codes belong to GICs **1–15**, and a single long code (for synchronized base stations) belongs to GIC **16**.

In the preferred embodiment of the present invention remote unit **113** searches for a particular base station as described by Higuchi et al. during an initial scan. More particularly, the long code phase of the best cell site is detected using a CSC masked filter. Next the long code GIC is identified by taking the cross-correlation between the received signal with all GIC candidates. Finally, all possible